# Year 9 Common - Term 4 2015

**TIME : 65 minutes**

Name:

Teacher:

## Directions

- Full working should be shown in every question.
- Marks may be deducted for careless or badly arranged work.
- Use black or blue pen only (not pencils) to write your solutions.
- No liquid paper/correction tape is to be used.
  If a correction is to be made, one line is to be ruled through the incorrect answer.
- The diagrams are not to scale.
- Approved calculators are allowed

*(For Teacher use only)*

## Marking Grid

| | Algebra, Surds & Indices | Measurement and Trigonometry | Coordinate and Quadratics | Statistics and Probability and Financial | **Total** |
|---|---|---|---|---|---|
| Part A | *2,4,7* /4 | *1,3* /3 | *5,6* /2 | *8* /2 | /11 |
| Part B | *1* /2 | *3* /2 | *2,4* /6 | | /10 |
| Part C | | | *1,2* /10 | | /10 |
| Part D | | | *1* /3 | *2,3* /9 | /12 |
| Part E | *1* /3 | *3* /4 | *2* /3 | | /10 |
| Part F | *1* /2 | *2,3* /9 | | | /11 |
| Part G | *2,3* /6 | *1* /3 | | | /9 |
| Multiple Choice | *3* /1 | *5* /1 | *4* /1 | *1,2* /2 | /5 |
| **Total** | /18 | /22 | /25 | /13 | /78 |

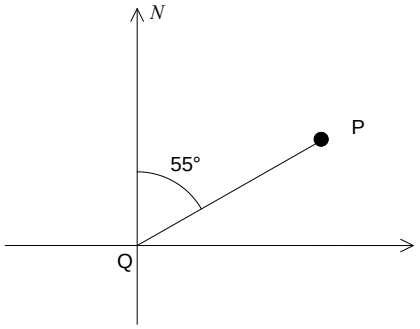
## Part A

**1** Evaluate, leaving your answer in scientific notation and correct to 3 significant figures. **2**

$$\frac{21.85 \times \sqrt{15}}{10^5 + 22.2}$$

**2** Simplify $\sqrt{8}$ - $\sqrt{98}$ **1**

**3** What is the true bearing of $Q$ from $P$? **1**




**4** Simplify fully **2**

$$\frac{8x^2 - 2}{2x - 1}$$

**5** Find the exact distance between $(3,5)$ and $(8,-10)$. **1**

**6** What is the gradient of the line $2y - 3x = 2$? **1**

**7** Rationalize the denominator **1**

$$\frac{5}{\sqrt{3} - 2}$$

**8** Draw a box plot for the following scores **2**

8, 4, 6, 8, 7, 9, 10.

## Part B

**1** Simplify $\frac{(a^4)^{-2}\times b^5}{a^9\times b^{-3}}$. **2**

Answer without negative indices.

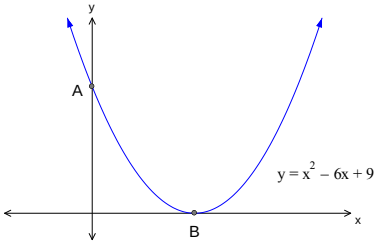
**2** Solve the following equations

a) $9x^2 - 16 = 0$ **2**

b) $5^{2x}=125^{x+1}$ **2**

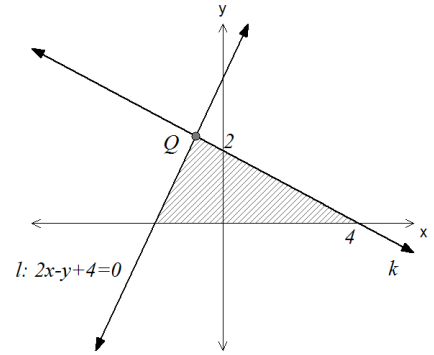
**3** If $\cos\theta=\frac{3}{7}$ and $\theta$ is acute, find the exact value of $\tan\theta$. **2**

**4** Find the coordinates of points $A$ and $B$ for the parabola given below. **2**



## Part C

**1** The diagram shows two lines $l$ and $k$.




(i) Show that the equation of the line $k$ is $x + 2y - 4 = 0$. **2**

(ii) Show that the point of intersection of $l$ and $k$ is $Q(\frac{-4}{5}, \frac{12}{5})$. **2**

(iii) Show that $l$ is perpendicular to $k$. **1**

(iv) Find the shaded area. **2**

**2** Solve for $x$. Answer in the exact simplest form. **3**

$$2x - \frac{17}{x+5} = 2$$

## Part D

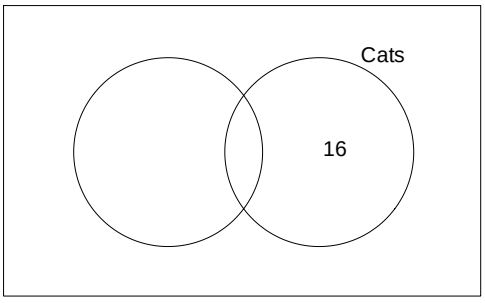
**1** Draw the graph of $y = (x-1)^2 - 4$, showing clearly the coordinates of the vertex and $x$ and $y$-intercepts. **3**

**2** A group of people were surveyed about the pet they owned.

(i) Complete the two-way table for the survey results. **1**

| | Dogs | No Dogs | Total |
|---|---|---|---|
| **Cats** | | 16 | |
| **No Cats** | 8 | | 20 |
| **Total** | 17 | | |

(ii) Transfer this information onto the Venn diagram below **2**




(iii) What is the probability that a person from the survey has neither dogs nor cats as pets? **1**

**3** Bianca wants to buy a new car priced at $15000. She does not have enough money so decides to buy it on hire purchase, with the following conditions.

***Deposit of $1500 with simple interest rate of 15%pa charged on the balance owing.***
***The loan is to be repaid in equal monthly instalments over 7 years.***

(i) How much did Bianca borrow to buy the car? **1**

(ii) How much interest did she pay? **2**

(iii) How much is each monthly instalment? **2**

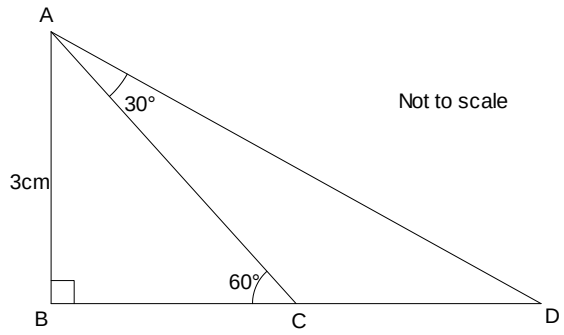
## Part E

**1** If $x = \sqrt{8} - 2$, find the value of $x + \frac{1}{x}$ in the simplest form. **3**

**2** Find the equation of a parabola passing through points (0,5) and (3,2), if the axis of symmetry of this parabola is $x = 2$. **3**

*(More space provided in the next column)*

**3**




Given right angled $\Delta ABC$ and $\Delta ABD$, where $\angle ACD = 60°$ and $\angle CAD = 30°$

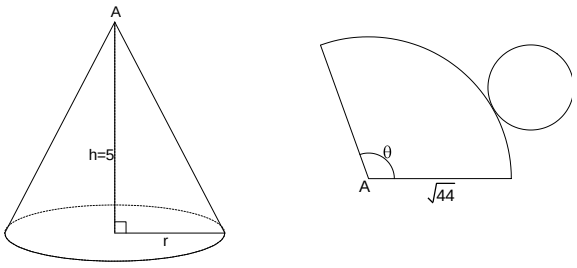
(i) Find the exact value of $BC$ **2**

(ii) Hence find the exact value of $CD$ **2**

## Part F

**1** If $x + y = 5$ and $x^2 - y^2 = 100$, find the value of $\frac{x}{y}$ **2**

**2**

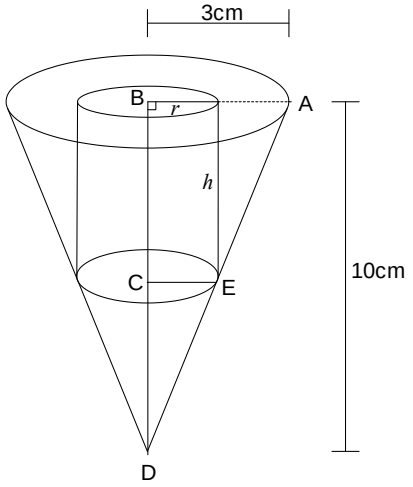



The diagram shows a cone and its net.

a) Find the base radius of the cone in exact form **1**

b) Hence find the surface area of the cone. Answer correct to 2 decimal places. **2**

**3**




A right cylinder of radius $r$ cm and height $h$ cm is inscribed in a cone with base radius 3 cm and height 10cm as shown in the diagram.

(i) Prove $\Delta BAD /// \Delta CED$ **2**

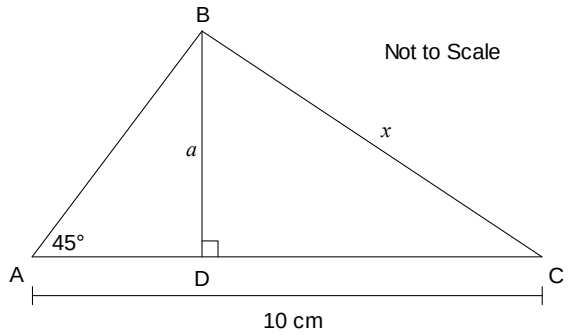
(ii) Hence, express $h$ in terms of $r$ . Give reasons for all your steps. **2**

(iii) Hence or otherwise show that the volume $V$ of the cylinder is given by $V = \frac{10\pi r^2(3-r)}{3}$ **2**

## Part G

**1** Given $\Delta ABC$, where $\angle BAC = 45°$, $BD \perp AC, BD = a, BC = x$ and $AC = 10cm$ **3**

Find an expression for $a$ in terms of $x$.



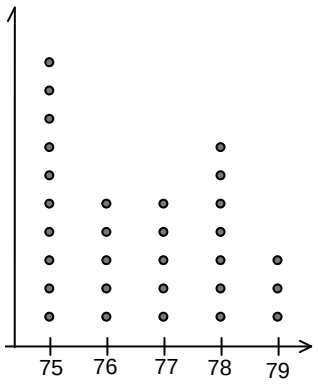

**2** (i) If $y = x(x-1)(x+1)$ **1**
Show that $y = x^3 - x$

(ii) Hence or otherwise, factorise fully **2**
$(2x+5)^3 - (2x+5)$

**3** Express $\dfrac{15^{2n} - 3^{2n}}{5^n + 1}$ in the form $A^n - B^n$, where $A$ and $B$ are integers. **3**

## Multiple Choice

**1**




The median score is

(A) 75

(B) 76.5

(C) 4

(D) 76

**2** Ron borrowed $18000 over 2 years.
He repaid a total of $21000.
What annual simple interest rate was he charged?

(A) 4.17%

(B) 9.09%

(C) 4.55%

(D) 8.33%

**3** $2x^3 + 54 =$

(A) $(2x + 6)(4x^2 - 12x + 36)$

(B) $(2x + 6)(x^2 - 3x + 9)$

(C) $(2x + 6)(x^2 + 3x + 9)$

(D) $(2x + 6)(4x^2 + 12x + 36)$

**4** Centre and radius of the circle with equation $(x + 1)^2 + (y - 3)^2 = 16$ is

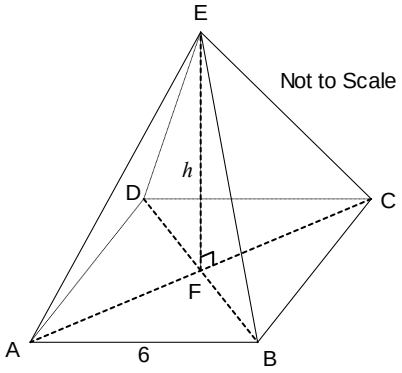
(A) $(1, -3), r = 4$

(B) $(1, -3), r = 16$

(C) $(-1,3), r = 4$

(D) $(-1,3), r = 16$

**5**




Given square based pyramid with $AB = 6cm$ and $EF = h$. If the volume is $120cm^3$, what is the slant height of this pyramid?

(A) 10

(B) $\sqrt{118}$

(C) $\sqrt{136}$

(D) $\sqrt{109}$

<u>Spare working space</u>

**End of Exam**